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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,180	10/15/2003	Lionell K. Griffith	LA-7171-109US	7586

7590 11/09/2007
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EXAMINER

KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
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2882

MAIL DATE	DELIVERY MODE
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11/09/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/687,180	Applicant(s) GRIFFITH, LIONELL K.	
	Examiner Chih-Cheng Glen Kao	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2007 and 12 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-14, 21-28 and 35-42 is/are allowed.
- 6) ☒ Claim(s) 1-6, 15-20 and 29-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 5, 15-17, 19, 29-31, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift (US 4472822) in view of Badea et al. ("A 3D Imaging System for Dental Imaging Based on Digital Tomosynthesis and Cone Beam CT") and Ruimi (US 6324246).

2. Regarding claims 1, 15, and 29, Swift discloses a method, system, and apparatus (title) for obtaining information about the internal structure of an object (fig. 3, object) and displaying the information as an image (fig. 5, via #32), comprising directing a ray of energy from a source (fig. 5, x-ray source) to and through the object to directly impinge on an energy sensor (fig. 5, "detector") defining an image plane, providing an axis of rotation (fig. 5, axis of rotation) with respect to the image plane (fig. 5, plane of detector), rotating the object (figs. 3 and 5, object) but not the energy source (fig. 5, x-ray source) about an axis of rotation (fig. 5, axis of rotation), thereby enabling information representative of the internal structure of the object to be acquired by the energy sensor at successive rotational positions of the object (abstract), and forming and displaying (fig. 5, via #32) said information as said image.

However, Swift fails to disclose digital tomosynthesis, obtaining a 3D volumetric image, and providing an axis at a canted angle with respect to an image plane.

Badea et al. teaches digital tomosynthesis (abstract and the second paragraph of the introduction). Ruimi teaches obtaining a 3D volumetric image (col. 7, lines 54-56) and providing (fig. 1, via #35) an axis (fig. 1, axis along the Z' axis) at a canted angle with respect to an image plane (col. 1, lines 45-58).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method, system, and apparatus of Swift with the digital tomosynthesis of Badea et al., since one would have been motivated to make such a modification for radiation protection (abstract) as shown by Badea et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method, system, and apparatus of Swift with the 3D volumetric imaging and canted angle of Ruimi, since one would have been motivated to make such a modification for better resolving image features via different angles (col. 1, lines 45-58) as implied from Ruimi.

3. Regarding claims 2, 3, 16, 17, 30, and 31, Swift further discloses in which the energy is in the form of electromagnetic radiation, and in which the electromagnetic radiation is x-ray radiation (title).

4. Regarding claims 5, 19, and 33, Swift further discloses in which an optical axis of the source (figs. 3 and 5, #11) is perpendicular to the image plane (figs. 3 and 5, #18).

5. Claims 4, 18, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift, Badea et al., and Ruimi as applied to claims 1, 15, and 29 above, and further in view of Hsieh (US 6226350).

Swift as modified above suggests a method, system, and apparatus as recited above.

However, Swift fails to disclose in which an energy sensor is a flat panel digital detector.

Hsieh teaches in which an energy sensor is a flat panel digital detector (col. 2, lines 27-31).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further modify the method, system, and apparatus of Swift as modified above with the detector of Hsieh, since one would have been motivated to make such a modification for obtaining projection data faster (col. 2, lines 27-31) as implied from Hsieh.

6. Claims 6, 20, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swift, Badea et al., and Ruimi as applied to claims 1, 15, and 29 above, and further in view of Yanof et al. (US 5371778).

Swift as modified above suggests a method, system, and apparatus as recited above.

However, Swift fails to disclose in which a ray of energy from a source is mathematically traced through a voxel of an object space to an image plane, a coordinate of a shadow of the voxel on the image plane is computed for each object rotation, and image data is extracted and combined to form the object space voxel.

Yanof et al. necessarily teaches in which a ray of energy from a source is mathematically traced through a voxel of an object space to an image plane, a coordinate of a shadow of the voxel on the image plane is computed for each object rotation, and image data is extracted and combined to form the object space voxel (figs. 4 and 5; and col. 7, line 29 – col. 8, line 5).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to further modify the method, system, and apparatus of Swift as modified above with the tracing, computing, extracting, and combining of Yanof et al., since one would have been motivated to make such a modification for faster processing (col. 2, lines 11-36) as implied from Yanof et al.

Allowable Subject Matter

7. Claims 7-14, 21-28, and 35-42 are allowed. The following is a statement of reasons for the indication of allowable subject matter.

8. Regarding claim 7, the prior art fails to disclose or fairly suggest a digitized tomosynthesis method, including rotating an object, but not an energy source, about an axis of rotation at a canted angle with respect to an image plane, determining the axis of rotation of the object, and comparing a location of a first shadow image and a location of a second shadow image to determine source and object angles relative to an energy sensor, in combination with all of the other limitations in the claim. Claims 8-14 contain allowable subject matter by virtue of their dependency.

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9. Regarding claims 21 and 35, the prior art fails to disclose or fairly suggest a digitized tomosynthesis system or apparatus, including at least one mechanism for determining an axis of rotation of an object, and one or more computer programs being capable of comparing a location of a first shadow image and a location of a second shadow image to determine source and object angles relative to an energy sensor, in combination with all of the other limitations in each respective claim. Claims 22-28 and 36-42 contain allowable subject matter by virtue of their dependency.

Response to Arguments

10. Applicant's arguments filed September 12, 2007, have been fully considered but they are not persuasive.

In response to Applicant's arguments against the references individually (see pg. 12, lines 20-21, the full sentence in the lines starting with "with respect to..."), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Swift discloses providing an axis of rotation (fig. 5, axis of rotation) ... with respect to the image plane (fig. 5, plane of detector), and rotating the object (figs. 3 and 5, object) but not the energy source (fig. 5, x-ray source) about the axis of rotation (fig. 5, axis of rotation). Ruimi teaches providing (fig. 1, via #35) an axis (fig. 1, axis along the Z' axis) of the object at a canted angle with respect to the image plane (col. 1, lines 45-58). Therefore, the combination of references suggests and makes obvious the steps of providing an axis of rotation (Swift) at a canted angle with respect to the

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image plane (Ruimi) and rotating the object but not the energy source about the axis of rotation (Swift).

Applicant further argues that Ruimi fails to disclose angling. The Examiner disagrees. The tilting (fig. 1, via #35) of Ruimi will provide an axis at a canted angle with respect to the image plane (fig. 1, plane of #30).

Applicant further argues that there is no suggestion of benefits of the object at a canted angle in regards to systems that do not involve a rotating gantry, since Ruimi only teaches benefits within the context of a rotating gantry system. Such an argument is not persuasive. Although, Ruimi does teach benefits within the context of a rotating gantry system, a rotating gantry system and a non-rotating gantry system are art-recognized equivalents (figs. 2 and 5) as shown by Swift. Therefore, the benefits of Ruimi within the context of the rotating gantry system would also apply to the non-rotating gantry system of Swift. Since Applicant has not provided any evidence to the contrary, Applicant's arguments are not persuasive.

Applicant further argues that there is no suggestion of the benefits of the object being at a canted angle. The Examiner disagrees. As recited above, it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method, system, and apparatus of Swift with the ... canted angle of Ruimi, since one would have been motivated to make such a modification for better resolving image features via different angles (col. 1, lines 45-58) as implied from Ruimi. Therefore, there is a suggestion of the benefits of the object being at a canted angle.

Applicant further argues that making such modifications would result in the patient being ejected from his support (pg. 14, third paragraph). The Examiner disagrees. Ruimi teaches

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providing an axis at a canted angle with respect to the image plane (fig. 1, via #35). Such a modification as applied to Swift would tilt the imaging system of Swift (fig. 5, x-ray source and detector), not eject the patient.

Applicant also argues that such modifications would not result in an up/down scan of the patient's body. The Examiner disagrees. As the Examiner has noted above, by providing the canted angle for the system (fig. 5, via the x-ray source and detector) of Swift as taught by Ruimi (fig. 1, via #35), the combination of references suggests and makes obvious an object rotated at a canted angle relative to the image plane. Further note that such a teaching in Ruimi, also refers to an up/down scan of the patient body (fig. 1, scan along the Z' axis). Therefore, making the modifications as taught by Ruimi will still result in an up/down scan of the patient's body.

In conclusion, Applicant's arguments are not persuasive, and the claims remain rejected.

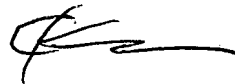
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Chih-Cheng Glen Kao
Examiner
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